installation guide

hp StorageWorks SAN switch 2/8

Product Version: Version 3.0.x

Second Edition (February 2003)

Part Number: AA-RSB6B-TE

This installation guide provides basic procedures for setting up, configuring, and managing the SAN switch 2/8 EL and SAN switch 2/8 Power Pak models.

hp invent

contents

Figures

Tables

This installation guide provides information to help you set up and configure the hp StorageWorks SAN Switch 2/8.

About this Guide topics include:

- Overview, page 10
- Conventions, page 11
- Rack Stability, page 14
- Getting Help, page 15

Overview

This section covers the following topics:

- Intended Audience
- Prerequisites
- Related Documentation

Intended Audience

This book is intended for use by customers who purchased the SAN switch 2/8 EL, or SAN switch 2/8 Power Pak, and for authorized service providers who are experienced with the following:

- Configuration aspects of customer Storage Area Network (SAN) fabric
- Customer host environments, such as Windows® 2000, Windows NT®, and IBM AIX
- Web Tools Graphical User Interface (GUI), for configuring the switch via a supported Web browser

Related Documentation

For a list of related documents included with this product, see the Related Documents section of the *hp StorageWorks SAN Switch 2/8 Version 3.0.2k Release Notes*.

For the latest information, documentation and firmware releases, please visit the following hp StorageWorks website:

http://www.q.c.com/storage/productindexdisk.html

For information about Fibre Channel standards, visit the Fibre Channel Industry Association website:

http://www.fibrechannel.org.

Conventions

Conventions consist of the following:

- Document Conventions
- Text Symbols
- Equipment Symbols

Document Conventions

The document conventions included in Table 1 apply in most cases.

Table 1: Document Conventions

Element	Convention
Cross-reference links	Blue text: Figure 1
Key and field names, menu items, buttons, and dialog box titles	**Bold**
File names, application names, and text emphasis	*Italics*
User input, command and directory names, and system responses (output and messages)	`Monospace font` `COMMAND NAMES` are uppercase monospace font unless they are case sensitive
Variables	`<monospace, italic font>`
Website addresses	Blue, underlined sans serif font text: http://www.hp.com

Text Symbols

The following symbols may be found in the text of this guide. They have the following meanings.

⚠ **WARNING:** Text set off in this manner indicates that failure to follow directions in the warning could result in bodily harm or death.

> **Caution:** Text set off in this manner indicates that failure to follow directions could result in damage to equipment or data.

> **Note:** Text set off in this manner presents commentary, sidelights, or interesting points of information.

Equipment Symbols

The following equipment symbols may be found on hardware for which this guide pertains. They have the following meanings.

Any enclosed surface or area of the equipment marked with these symbols indicates the presence of electrical shock hazards. Enclosed area contains no operator serviceable parts.

WARNING: To reduce the risk of personal safety from electrical shock hazards, do not open this enclosure.

Any RJ-45 receptacle marked with these symbols indicates a network interface connection.

WARNING: To reduce the risk of electrical shock, fire, or damage to the equipment, do not plug telephone or telecommunications connectors into this receptacle.

Any surface or area of the equipment marked with these symbols indicates the presence of a hot surface or hot component. Contact with this surface could result in injury.

WARNING: To reduce the risk of personal safety from a hot component, allow the surface to cool before touching.

Power supplies or systems marked with these symbols indicate the presence of multiple sources of power.

WARNING: To reduce the risk of personal safety from electrical shock, remove all power cords to completely disconnect power from the power supplies and systems.

Any product or assembly marked with these symbols indicates that the component exceeds the recommended weight for one individual to handle safely.

WARNING: To reduce the risk of personal personal safety or damage to the equipment, observe local occupational health and safety requirements and guidelines for manually handling material.

Rack Stability

Rack stability protects personal and equipment.

> ⚠ **WARNING:** To reduce the risk of personal safety or damage to the equipment, be sure that:
> - The leveling jacks are extended to the floor.
> - The full weight of the rack rests on the leveling jacks.
> - In single rack installations, the stabilizing feet are attached to the rack.
> - In multiple rack installations, the racks are coupled.
> - Only one rack component is extended at any time. A rack may become unstable if more than one rack component is extended for any reason.

Getting Help

If you still have a question after reading this guide, contact an HP authorized service provider or access our website:

http://www.hp.com

HP Technical Support

In North America, call technical support at 1-800-652-6672, available 24 hours a day, 7 days a week.

Note: For continuous quality improvement, calls may be recorded or monitored.

Outside North America, call technical support at the nearest location. Telephone numbers for worldwide technical support are listed on the HP website under support:

http://thenew.hp.com/country/us/eng/support.html

Be sure to have the following information available before calling:

■ Technical support registration number (if applicable)

■ Product serial numbers

■ Product model names and numbers

■ Applicable error messages

■ Operating system type and revision level

■ Detailed, specific questions

HP Storage Website

The HP website has the latest information on this product. Access storage at:

http://thenew.hp.com/country/us/eng/prodserv/storage.html

From this website, select the appropriate product or solution.

HP Authorized Reseller

For the name of your nearest HP authorized reseller:

■ In the United States, call 1-800-345-1518

■ In Canada, call 1-800-263-5868

■ Elsewhere, see the HP website for locations and telephone numbers:

http://www.hp.com.

Overview

1

The HP StorageWorks SAN Switch 2/8 is a high-performance 8-port, 2 gigabit (Gb) Fibre Channel (FC) switch used to interconnect storage devices, hosts, and servers in a SAN.

The hp StorageWorks SAN switch 2/8 is offered in two configurations; the 2/8 EL and 2/8 Power Pak. Refer to the *hp StorageWorks SAN Switch 2/8 Version 3.0.2k Release Notes* for a complete list of management features enabled on your specific switch.

Note: This guide refers to both models as the SAN Switch 2/8, unless otherwise noted.

This chapter provides the following information:

- SAN Switch 2/8 Features, page 18
- Firmware, page 18
- Hardware, page 18

SAN Switch 2/8 Features

Read the following sections for feature-specific information.

Firmware

The SAN Switch 2/8 operates using Fabric Operating System firmware V3.0.2k. The firmware supports:

- High-speed data traffic using Interswitch Link (ISL) trunking technology.

- Automatic re-routing through the Fabric Shortest Path First (FSPF) algorithm.

- Application Programming Interface (API); a protocol that allows applications to interface with switch services.

- Zoning functionality provides a means to allocate storage controllers to groups of computers. Allows you to create logical subsets of the fabric to accommodate closed user groups or to create functional user groups within a fabric.

  For more information refer to the *hp StorageWorks Zoning V3.0.x/V4.0.x User Guide*.

- Per port statistics help technicians diagnose and isolate problem ports without disrupting switch operations.

- Error detection and fault isolation, automatically disables failing ports and restarts when the problem is resolved.

- Industry standard Simple Network Management Protocol (SNMP) Management Information Base (MIB) support.

- Automatic self-discovery, discovers and registers host server and storage devices.

- Web Tools provides a Graphical User Interface (GUI) to allow management of a SAN from a browser such as Internet Explorer or Netscape.

Hardware

SAN Switch 2/8 consists of the following components:

- A 1 Unit (U) chassis, designed for mounting in a 19-inch rack, with forced-air cooling that flows from the back of the switch to the front

- 8 optical ports, compatible with Small Form Factor Pluggable media (SFPs), supplied by the customer

- ■ One RS-232 Serial port (DB9 connector) on the front panel
- ■ One IEEE compliant RJ-45 connector on the front panel for use with 10/100 Mbps Ethernet or in-band
- ■ A total of 20 LEDs:
  - — One power switch LED on the front panel
  - — One port status LED for each of the 8 ports on the front panel
  - — One port speed LED for each of the 8 ports on the front panel
  - — One Ethernet speed LED on the front panel
  - — One Ethernet activity LED on the front panel
  - — One port readiness LED on the back panel
- ■ Universal input power supply with AC switch
- ■ Five fans

SFP Media Side

Figure 1 shows the SFP media side of the SAN Switch 2/8. The front panel houses the Serial port, Ethernet port, eight fiber optic ports with corresponding LEDs, and the power switch LED.

SHR-2493B
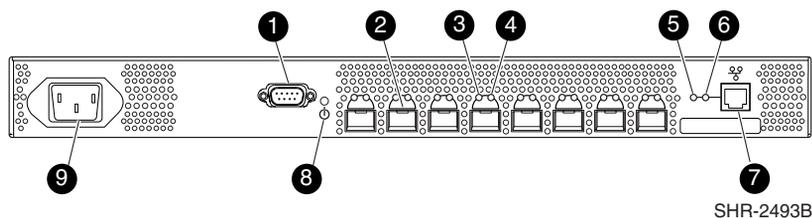
❶	Serial port	❻	Ethernet activity LED
❷	Optical ports (8)	❼	Ethernet port
❸	Port status LEDs (8)	❽	Switch power LED
❹	Port speed LEDs (8)	❾	Power connector
❺	Ethernet speed LED		

Figure 1: SFP media side

Optical Ports

The SAN Switch 2/8 optical ports support link speeds up to 2 Gbps. Each port automatically negotiates to the highest common speed of all devices connected. Additionally, the switch supports F_port, FL_port, and E_port connections and Distributed Name Server (DNS).

The ports are color-coded into two groups of four, to indicate which ports are used in the same ISL Trunking group. Each port conforms to the American National Standards Institute (ANSI) Fibre Channel, FC-PI specification for Fibre Channel SFP transceivers.

ISL Trunking

ISL trunking is an *optional* Fabric OS feature that enables distribution of traffic over the combined bandwidth of up to four ISLs between two directly adjacent switches, while preserving in-order delivery. For specific information about ISL trunking, refer to the *hp StorageWorks ISL Trunking V3.0.x/V4.0.x User Guide*.

SFPs

The ports connect to SFP media. SFPs are universal and self-configuring.

Fan Side

Figure 2 shows the fan side of the SAN Switch 2/8. The rear panel houses the five fans, and port readiness LED.

SHR-2494B
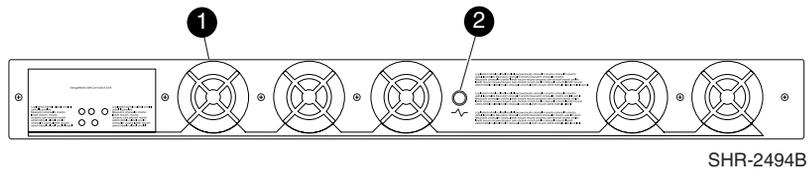
❶ Fan (5)
❷ Port readiness LED

Figure 2: Fan side

Optional Hardware Kits

HP provides the following optional hardware kits in support of the SAN Switch 2/8, see Table 2.

Table 2: SAN Switch 2/8 Orderable Hardware

Accessory	Part Number
Short wavelength SFP	A6515A* or 300834-B21**
Long wavelength SFP, 10 km	A6516A* or 300835-B21**
2m LC-to-LC Fibre Channel (fc) cable	C7524A*
2m LC-to-LC multi-mode fc cable	221692-B21**
16m LC-to-LC fc cable	C7525A*
5m LC-to-LC multi-mode fc cable	221692-B22**
50m LC-to-LC fc cable	C7526A*
15m LC-to-LC multi-mode fc cable	221692-B23**
200m LC-to-LC fc cable	C7527A*
30m LC-to-LC multi-mode fc cable	221692-B26**
50m LC-to-LC multi-mode fc cable	221692-B27**
2m LC-to-SC fc cable	C7529A*
2m LC-to-SC multi-mode fc cable	221691-B21**
16m LC-to-SC fc cable	C7530A*
5m LC-to-SC multi-mode fc cable	221691-B21**
15m LC-to-SC multi-mode fc cable	221691-B23**
30m LC-to-SC multi-mode fc cable	221691-B26**
50m LC-to-SC multi-mode fc cable	221691-B27**
SC female to SC female adapter	C7534A*
2m LC male to SC male adapter kit	C7534A*

* premerger HP part number
** premerger Compaq part number

Installing the SAN Switch 2/8

2

This chapter covers the following topics:

Important Information about the Four Switch Limitation for 2/8 EL Models Only

The SAN Switch 2/8 EL shipping configuration integrates the IV_Domain_Fabric license. The IV_Domain_Fabric license limits the number of switches that can be connected to a single fabric to four. If more than four switches (of any type) are added to the fabric where 2/8 EL switches are installed, Web Tools generates multiple error messages. Read the following sections for specific error messages and workarounds related to the four switch limitation.

Note: Upgrade the 2/8 EL to full fabric support by installing an optional upgrade license. See the "Four Switch Limitation Workarounds" section on page 27 for instructions on how to purchase the Full Fabric license.

Check the License Installed

To verify the switch's current license, use the command:

```
licenseshow
```

You do not have to delete the IV_Domain_Fabric license before upgrading to the Full Fabric license.

Four Switch Limitation Errors

The following section summarizes the error messages generated when more than four switches are installed in a fabric with the SAN Switch 2/8 EL.

Note: An operator can build a SAN with more than four switches by upgrading the SAN Switch 2/8 EL to Full Fabric. To upgrade, you must install the optional Full Fabric license on each SAN Switch 2/8 EL. See the "Four Switch Limitation Workarounds" section on page page 27 for instructions on how to purchase the Full Fabric license.

Four Switch Limitation CLI Error Messages

If the fabric detects that the four switch limitation has been exceeded, the following message occurs every thirty seconds, via the Command Line Interface (CLI), as follows:

```
CRITICAL FABRIC-SIZE_EXCEEDED, 1, Critical fabric size <8>
exceeds supported configuration <4>. Switch status marginal.
Contact Technical Support.

WebTools will be disabled in 39 days 8 hours and 46 minutes.
```

The switch warning messages may be stored in the Syslog. Third party application SNMP traps may be configured on the switch.

Four Switch Limitation Web Tools Error Messages

If the fabric detects that the number of switches installed exceeds the four switch limit, Web Tools displays a warning message every 75 seconds (not configurable). Figure 3 shows a typical Web Tools Warning Message.

Figure 3: Four switch limitation Web Tools error message

Note: The SAN Switch 2/8 EL displays a separate error condition warning message in the dialog box.

If the timer expires while trying to access Web Tools (for example, Zone Admin, Switch Admin, or Switch View), an HTML file similar to *license.htm* appears, stating that Web Tools is disabled. In addition, a prompt displays (see Figure 4) allowing you to install the optional Fabric license. After the Full Fabric license is installed, all Web Tools functionality resumes.

> **The 45-day grace period has passed. WebTools is disabled.**
> **To enable WebTools, please install the Fabric license on switch**
> **Switch World Wide Name: 10:00:00:60:69:5a:01:92**
>
> **License Key:** [ ]
> [Add License]   [Remove License]
> **Or contact your Technical Support Representative.**
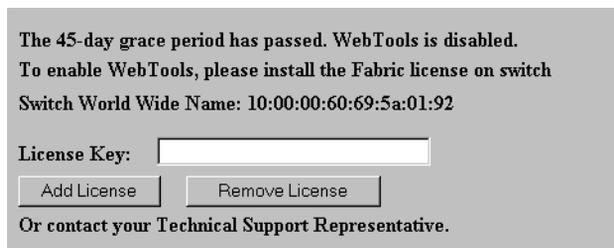
Figure 4: Full Fabric license install prompt in Web Tools

Violation Timer Errors

The violation timer begins decrementing when the four switch limitation is exceeded. The timer is cumulative. Resetting the power cycle will not reset the timer.

If the switch is moved to a fabric with less than five switches, the error condition is cleared; however, the violation timer stops counting down. If the switch is moved to a fabric with more than four switches, the violation timer continues from where it left off. When the accumulative violation timer reaches 45 days (not configurable), Web Tools for that switch is disabled. A message similar to Figure 4 displays in a telnet session or error log.

Note: When Quiet Mode is enabled on a SAN Switch 2/8 EL with a IV_FABRIC license installed, the four switch limitation warning messages display. If the IV_FABRIC license is not installed, Quiet Mode works as described in the *hp StorageWorks Fabric OS V3.0.x/V4.0.x Reference Guide*.

Additional Alerts

If the fabric size exceeds the four switch limit, the switch experiences the following activity:

■   In Fabric Manager and Web Tools, the switch icons in Fabric View turn yellow for every 2/8 EL installed in a fabric that exceeds the four switch limit. For example, in Web Tools the following message appears in the bottom left hand corner of the window:

```
The Fabric has changed - - Reload / Refresh
```

Note: To prevent this message from reappearing, you must update to the *optional* Full Fabric license. Please note that removing the Ethernet connection will not eliminate this message. See the "Four Switch Limitation Workarounds" section on page 27 in this chapter for instructions on how to purchase the Full Fabric license.

■   The switch beacons continuously, with front panel LEDs lighting amber, similar to a firmware download. The switch stops beaconing during reconfiguration, switchdisable, switchenable. It also stops beaconing when the error condition no longer exists. Beaconing resumes if the error is detected again.

Four Switch Limitation Workarounds

Use one of the following workarounds to prevent four switch limitation errors.

■   Upgrade the current SAN Switch 2/8 EL IV_Domain_Fabric license to the *optional* Full Fabric license. The Full Fabric license provides full fabric functionality, with no limits on the number of switches in the fabric.

For purchasing information, contact your authorized HP Sales representative, or go to the HP website:

http://www.hp.com

■   In fabrics which contain five or more switches and that have at least one switch with the IV_FABRIC license installed, reduce the number of switches to four or less.

Unpack and Verify Carton Contents

Unpack and inspect the SAN Switch 2/8 carton contents as follows.

1. Inspect the shipping cartons for possible damage caused during transit.

2. Unpack the shipping cartons.

3. Verify that the carton contains the items shown in Figure 5 and Table 2. If any items are damaged or missing, please contact HP or an HP authorized reseller.

Note: The Rack Mount Kit shown in Figure 5 may not represent the kit that shipped with your switch. HP reserves the right to substitute Rack Mount Kits, providing applicable instructions with each switch.

SHR-2495B
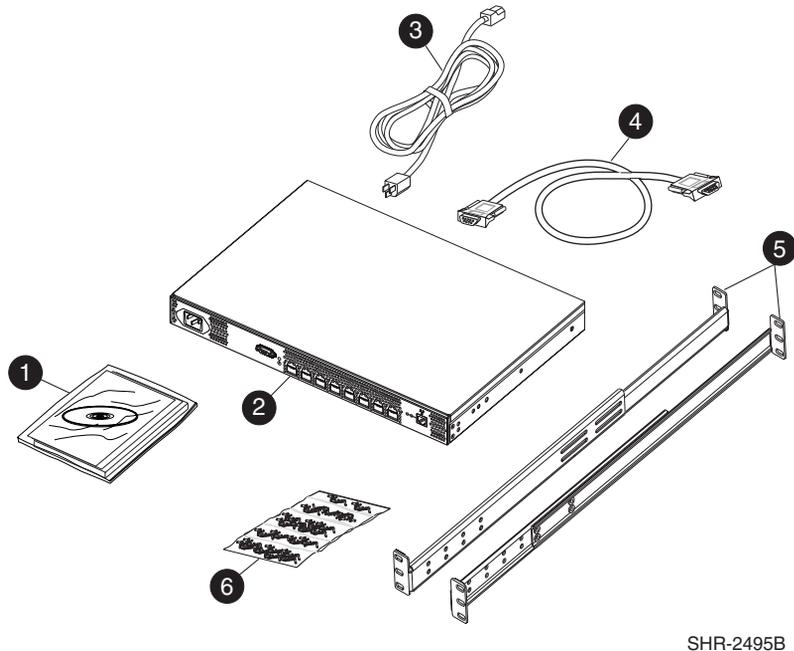
Figure 5: Carton contents

Table 3: Shipping Carton Contents

Item Number	Description
1	One HP StorageWorks SAN Switch 2/8 product accessory bag containing CD, license, documentation and Release Notes
2	HP StorageWorks Switch 2/8
3	Two standard AC power cords, and two PDU cords
4	One RS-232 Serial cable
5	*Fixed Rack Mount Kit containing: • right front bracket • left front bracket • right rear bracket • left rear bracket
6	Pouch containing Fixed Rack Mount Kit hardware: • 8-32 x 5/16" pan head Phillips screws (6) • 6-32 x 5/16" pan head Phillips screws (8) • 10-32 x 3/8" pan head Phillips screws (8) • retainer nuts (8) • rubber mounting feet (4), use if installing on a flat surface

* Depending on time of purchase, the Fixed Rack Mount Kit items listed in Table 3 may not represent the kit that shipped with your switch.

Installation and Safety Guidelines

Read the following sections for installation guidelines. Install the SAN Switch 2/8 in one of the following ways:

■ as a stand-alone unit on a flat surface, or

■ as a fixed component in the HP 9000 Series (or comparable) EIA Rack using the Fixed Rack Mount Kit provided. Fixed Rack Mount Kit contents are outlined in Table 3.

■ as a fixed component in the HP System/e rack models

Selecting an Operating Location

To ensure correct operation of the switch, the location where the switch is in use must meet the following requirements:

■ Adequate supply circuit, line fusing, and wire size, as specified by the electrical rating on the switch nameplate.

■ An air flow of at least 300 cubic feet per minute, available in the immediate vicinity of the switch.

■ If installing the switch in the HP 9000 Series, HP System/e, or comparable Electronics Industries Association (EIA) rack:

— All equipment installed in the rack should have a reliable branch circuit ground connection, and should not rely on a connection to a branch circuit, such as a power strip.

— The rack should be balanced and the installed equipment within the rack's weight limits. Ensure the rack is mechanically secured to ensure stability in the event of an earthquake.

Cooling Requirements

Caution: Do not block air vents. Blocking switch air vents may result in the switch overheating.

Cooling air is drawn into the switch chassis by the fans mounted on the rear of the chassis. The air is expelled through vents in the front of the chassis. HP recommends installing the switch so that air intake and exhaust for all components in the rack is flowing in the same direction.

Power Requirements

One AC power cord connects to the switch. The AC power source must meet these requirements:

- A properly wired, earth-grounded AC outlet
- Voltage capability of 85-264 VAC
- Input voltage frequency of 47-63 Hz
- Power capability of 75 watts, maximum

The switch uses a universal power supply capable of functioning worldwide without voltage jumpers or switches. The power supply is auto ranging in terms of accommodating input voltages and line frequencies.

Installing the Switch as a Stand-alone Unit

Use these procedures for setting up the switch as a stand-alone unit. The following items are required for this setup:

■ SAN Switch 2/8

■ AC power cord and cables supplied with the switch

■ Rubber mounting feet supplied with the switch

1. Place the SAN Switch 2/8 on a flat, sturdy surface like a table or lab bench.

> **Caution:** Installing the rubber feet on the switch is recommended to help prevent the switch from accidentally sliding off the table or bench.

2. Apply the rubber feet as follows.

    a. Clean the four depressions that are at each corner of the bottom of the switch to ensure they are free of dust.

    b. Place a rubber foot in each depression, with the adhesive side against the chassis, and press into place.

3. Connect the power cable to the SAN Switch 2/8 power supply and to a power outlet. Ensure the power cable is routed so that it is not exposed to stress.

4. Turn on the power to the switch (flip the AC switch to "1"). The switch automatically runs a Power On Self-Test (POST).

> **Note:** Do not connect the switch to the network until the IP address is correctly set. For instructions on how to set the IP address, see the "Configuring SAN Switch 2/8 Network Addressing" section on page 47.

Installing the SAN Switch 2/8 in a 9000 Series or Comparable EIA Rack

Read the following sections for complete installation instructions.

Obtain the following tools:

- Fixed Rack Mount Kit (supplied with the switch)
- A #2 Phillips screwdriver with torque capability
- Clamps or other means to temporarily support the switch
- Torque screwdriver

> **Caution:** The SAN Switch 2/8 ships with the complete set of rack mount hardware required for installation in an EIA rack. HP recommends using the exact screws specified for use with the switch chassis. Using screws longer than the specified length may damage the switch.

Installing the Fixed Rail Kit

The SAN Switch 2/8 Fixed Rack Mount Kit consists of two rail assemblies. Read the following sections for complete instructions on attaching the rails to the switch, then installing the switch in the rack.

1. Attach the left and right front brackets to the switch chassis as follows:

   a. Position one left front bracket (Item 1) with the flat side against right side of switch, oriented as shown in Figure 6.

> **Note:** Four sets of holes are provided to allow the switch to be set back from the front of the rack, if desired. This allows a more gradual bend in any fiber optic cables connected to the switch.

   b. Insert two 8-32 x 5/16 inch screws (Item 7) into one of the pairs of vertically aligned holes in both the bracket and in the switch.

   c. Insert one 8-32 x 5/16 inch screw (Item 7) into one of the single holes in both the bracket and in the switch.

   d. Tighten screws to a torque of 15-inch pounds.

2. Repeat steps 1a through 1d to attach right front bracket (Item 8) to the right side of the switch, see Figure 6.
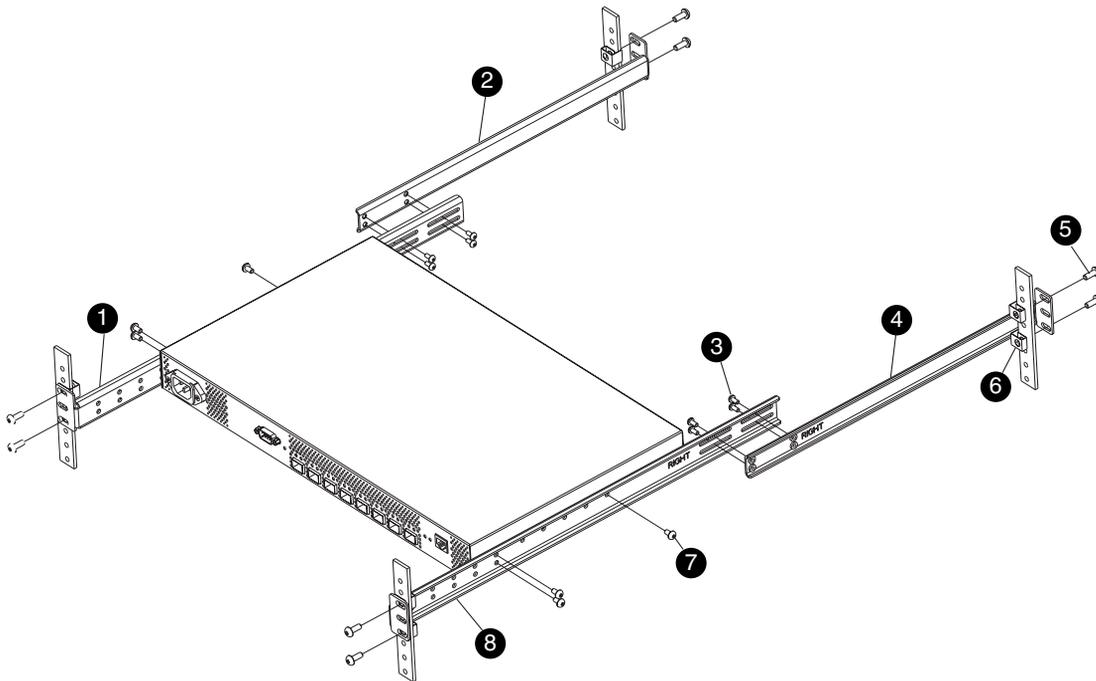
SHR-2501A

❶	Left front bracket	❺	10-32 x 38" pan head Phillips screws
❷	Left rear bracket	❻	Retainer nuts
❸	6-32 x 5/16" pan head Phillips screws	❼	6-32 x 5/16" pan head Phillips screws
❹	Right rear bracket	❽	Right front bracket

Figure 6: Attaching the Fixed Rack Mount Kit rails to the switch

3. Position the switch in the rack as shown in Figure 6, providing temporary support under the switch (use clamps if necessary).

4. To secure the front brackets to the rack's front rails, attach the right front bracket (Item 8) to the right front rack rail using two 10-32 x 3/8 inch screws (Item 5) and two retainer nuts (Item 6).

5. Repeat step 4 to attach the left front brackets (Item 1) to the left front rack rail.

6. Tighten all screws and torque to 25-inch pounds.

7. Attach the rear brackets to the front brackets as follows:

   a. Position the right rear bracket (Item 4) inside the right front bracket (Item 8). See Figure 6.

   b. Secure the brackets using four 6-32 x 5/16 inch screws (Item 3). See Figure 6.

   c. Adjust the brackets to the appropriate rack depth and tighten screws to a torque of 9-inch pounds.

8. Repeat Steps 7a through 7c to attach the left rear bracket (Item 2) to the left front bracket (Item 1).

9. Attach the right rear bracket (Item 4) to the right rear rack rail using two 10-32 x 3/8 inch screws (Item 5) and two retainer nuts (Item 6).

10. Repeat step 9 to attach the left rear bracket (Item 2) to the left rear rack rail.

11. Tighten all screws to a torque of 25-inch pounds.

12. Connect the SAN Switch 2/8 power cord to the power connector on the switch. See Figure 7.

SHR-2496B
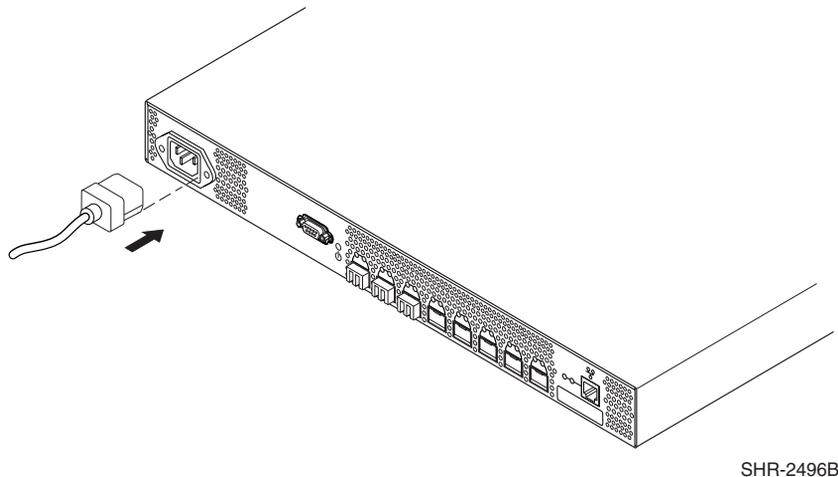
Figure 7: Connecting the power cord

Optional HP System/e Rack

This section lists instructions for installing the SAN Switch 2/8 in the *optional* HP System/e Rack.

Items Required for the HP System/e Rack

The HP System/e Rack Kit consists of the following items:

- HP System/e Rack Rail Kit, part number A7340-87901
- Plenum, part number A7346-00001
- HP System/e Rack Rail Kit Hardware, part number A7340-87902, shown next:
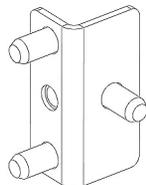
(2) Rear mounting bracket

(8) #8-32 x 5/16 Phillips pan-head screw with captive star lock washer

(8) #8 Flat washer

(6) M5 Torx head screw with captive lock washer

(2) Rubber washer

(4) M5 U-type tinnerman clip

(4) #10-32 square Tinnerman nut (Use if installing in HP 9000 Series rack/ EIA rack)

(4) #10-32 x 5/8 Phillips pan-head screw with attached lock washer (Use if installing in HP 9000 Series rack/ EIA rack))

(6) Spacer (Use if installing in HP 9000 Series rack/ EIA rack)

(4) M5 flat washer ((Use if installing in HP 9000 Series rack/ EIA rack)

Installing the Switch in the Optional HP System/e Rack

Before you begin, locate the following items to install the SAN Switch 2/8 in the HP System/e Rack Kit:

■ SAN Switch 2/8

■ #2 Phillips and T25 Torx screwdrivers

> ⚠ **Caution:** F or proper airflow, the SFP media side of the SAN Switch 2/8 must face the rear of the rack. This mounting allows air to enter the front of the rack through the plenum and to exhaust at the rear of the rack, preventing overheating.

1. Select a mounting location in the rack for the switch.

2. Attach the rear rail-tray brackets to the rear rack uprights by installing each of the two mounting brackets with one M5 Torx head screw with captive lock washer as shown in Figure 8.
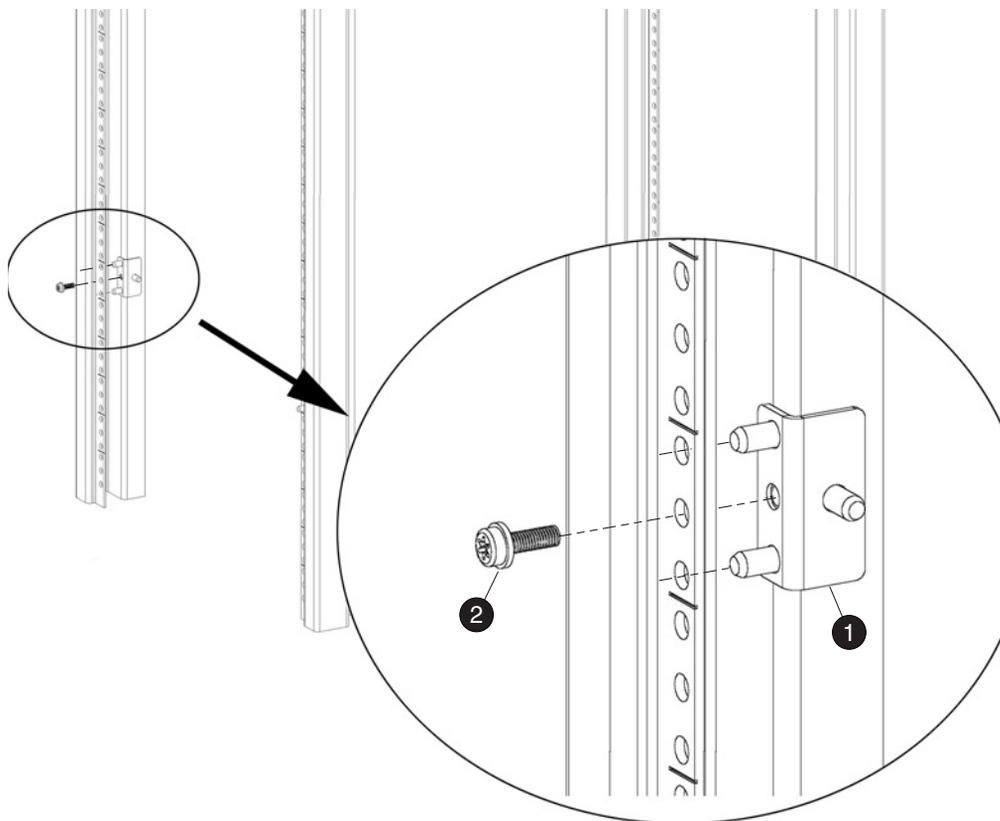
SHR-2557

❶ Rear rail tray bracket   ❷ M5 Torx head screw with captive lock washer

Figure 8: Installing the rear rail tray brackets

3. Install two M5 U-type Tinnerman clips for each of the front columns of the rack in the top and bottom positions of the three-hole EIA pattern as shown in Figure 9.

SHR-255
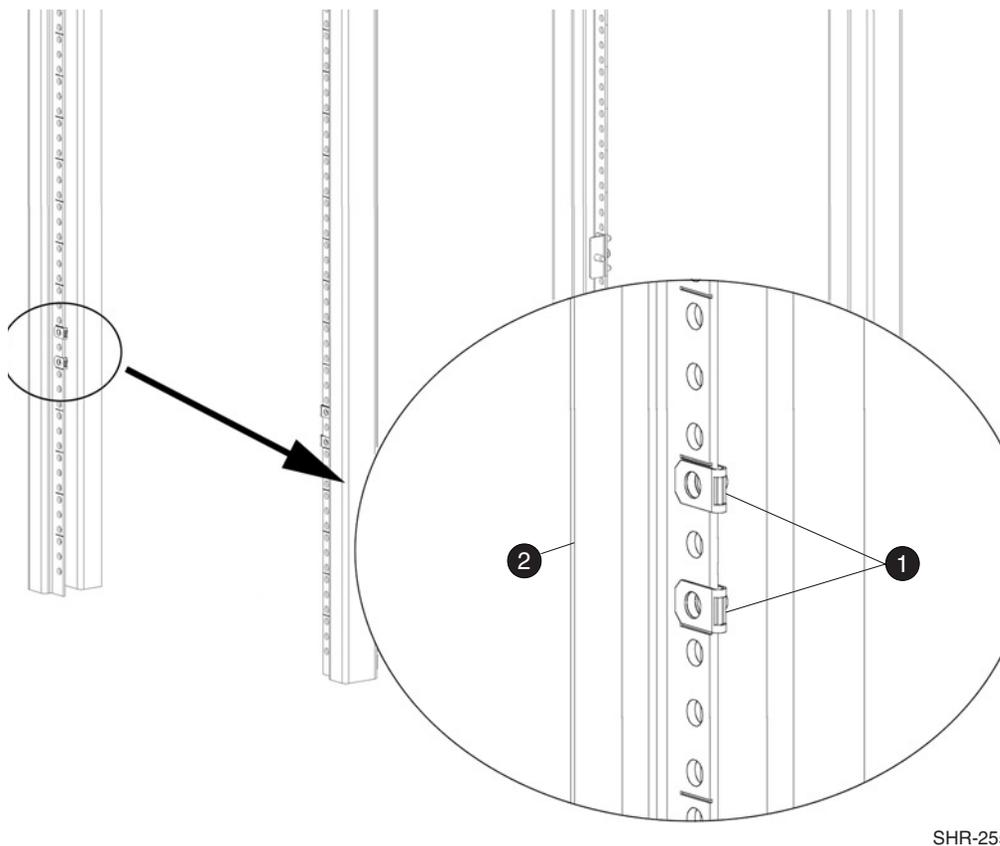
❶   M5 U-type tinnerman clips   ❷   Upright rack post

Figure 9: Installing the tinnerman clips

4. Assemble the outer rails by completing the following steps:

   a. As an aid in assembly, two rubber washers have been included to help keep the rear slotted portion of the outer rail flush against the rear rail-tray brackets. Install them as shown in Figure 10.

SHR-2559A
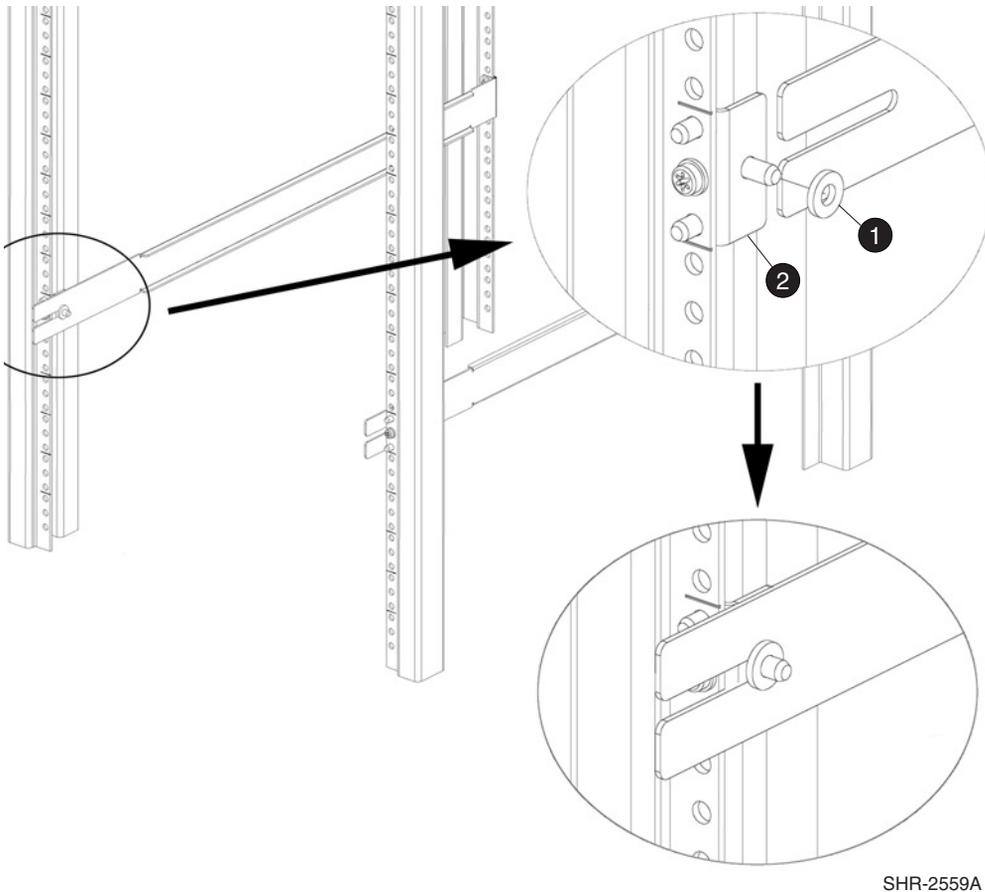
❶   Rubber washer (1 of 2)   ❷   Rear rail tray bracket (1 of 2)

Figure 10: Installing the rubber washers

         b. Insert the alignment pins attached to the outer rail front flange into the center opening in the rack.

         c. Install one M5 Torx screw in the upper hole location of the right rail. Then, install one M5 Torx screw in the lower location of the left rail. See Figure 11.

Note: Do not install the upper left and lower right screws until later.

SHR-2560A
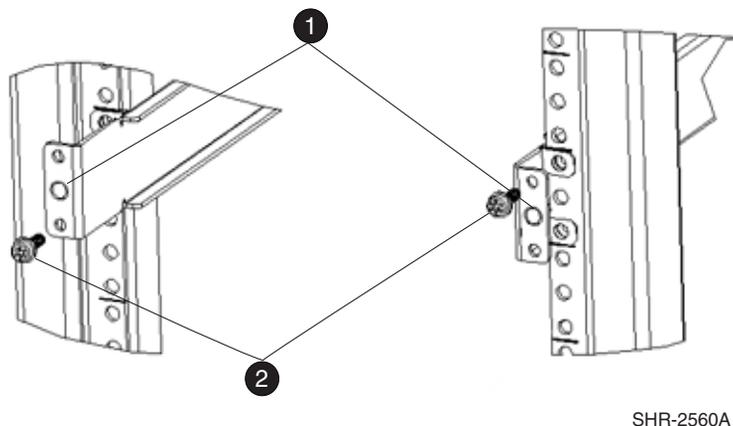
❶   Outer rail alignment pins   ❷   M5 torx screws

Figure 11: Assembling the outer rails

5. Assemble each of the two inner rails (one on each side of the switch and plenum) using eight #8-32 x 5/16 Phillips pan-head screws (with attached star lock washers) and eight #8 flat washers as shown in Figure 12.

⚠ **Caution:** Do not use any other screws other than the eight that are provided. Use of any longer lengths can cause damage to internal components of the switch. Be sure to install the flat washers along with the pan-head screws. Before tightening screws, make sure that the rails are centered to the overall height of the switch.

Note: Please note that the numbered items shown in Figure 12 must be ordered separately.
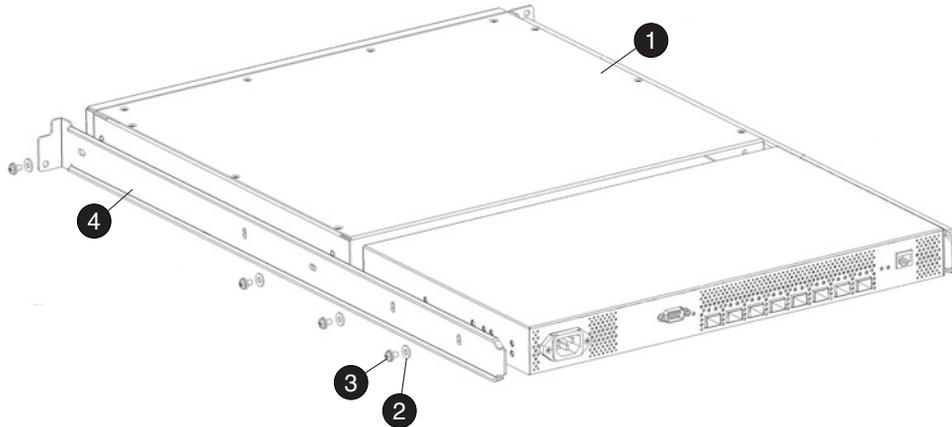
SHR-2561A

❶ Plenum   ❸ Flat washers
❷ 8-32 x 5/16 phillips pan head screws   ❹ Inner rails (1 of 2)

Figure 12: Assembling the inner rails

6. Insert the switch with the attached inner rails into the outer rails as shown in Figure 13.
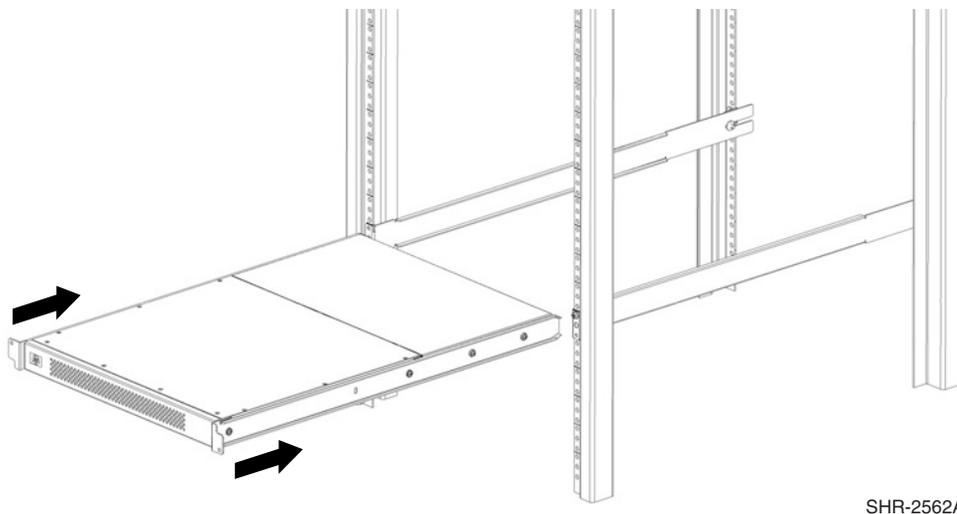
SHR-2562A

Figure 13: Installing the switch into an HP Rack

7. Install the two remaining M5 Torx screws into the upper left and lower right holes to complete the installation. See Figure 14.
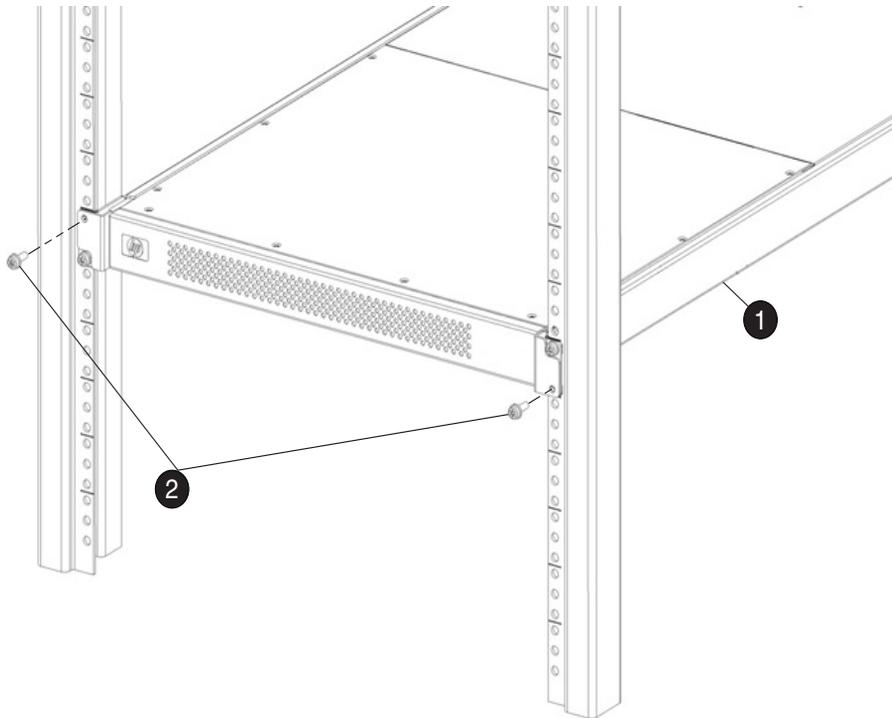
SHR-2563A

❶   Outer slide rail (1 of 2)   ❷   Two M5 torx screws

Figure 14: Securing the switch

8. Connect the power cord to the switch power supply and to a power outlet. Ensure the power cord is routed so that it is not exposed to stress. Power is supplied to the switch as soon as the cord is connected. The switch runs POST by default each time it is turned on.

Note: Do not connect the switch to the network until the IP address is correctly set. For instructions on how to set the IP address, see "Configuring SAN Switch 2/8 Network Addressing," later in this chapter.

Power On Self-Test

Each time the switch is powered on, rebooted, or reset, the switch automatically runs a Power On Self-Test (POST). During POST the port status LEDs flash, verifying that the switch is operating properly. POST completes in approximately six minutes, with total boot time approximately seven minutes.

POST runs through the following test cycles:

■ Preliminary POST diagnostics

■ Initialization of operating system

■ Initialization of hardware

■ Diagnostic tests are run on a number of functions, including circuitry, port functionality, memory, parity, statistics counters, and serialization

For example, if the switch prompt does not display when POST completes, POST was unsuccessful. Contact your authorized HP switch supplier for more information.

To determine whether POST completed without errors, verify that all LEDs return to a normal state after POST is complete. If one or more LEDs do not return to a normal state (and this is not due to the switch being set to beacon), see "Interpreting LED Activity" on page 60 in Chapter 3.

Note: For more information about beaconing, refer to the *hp StorageWorks Fabric OS Procedures V3.0.x/V4.0.x User Guide*.

Checking POST Results

Check the success/fail results of the diagnostic tests run during POST via LED activity, the error log, or the CLI using the **errShow** command. For more information about error messages, refer to the *hp StorageWorks Fabric OS V3.0.x/V4.0.x Reference Guide*.

Configuring SAN Switch 2/8 Network Addressing

Read the following sections for information on how to configure the SAN Switch 2/8 addressing scheme.

Requirements

The following items are required to set network addressing.

■ An IP address from your Network Administrator

■ SAN Switch 2/8 installed and connected to a power source

■ Serial cable (supplied with the switch) for connecting the switch to the workstation

■ A local workstation (desktop or notebook computer) with:

— Microsoft® Windows 98, Windows 2000, Windows Millennium Edition, or Windows NT 4.0 operating system

— RS-232 serial communication software (for example, ProComm Plus or HyperTerminal)

■ Ethernet cable for connecting the switch to the workstation or to a network containing the workstation

■ SFPs and cables, as required to connect the switch to the fabric

Setting Network Addresses via a Serial Connection

Use the following steps to verify or change the SAN Switch 2/8 IP address, subnetmask, or gateway address.

Note: During first time setup, you must replace the factory IP, subnetmask and gateway addresses with addresses provided by your Network Administrator.

1. Remove the shipping plug from the SAN Switch 2/8 Serial port.

2. Connect the Serial cable to the SAN Switch 2/8 Serial port, see Figure 15.

SHR-2497B
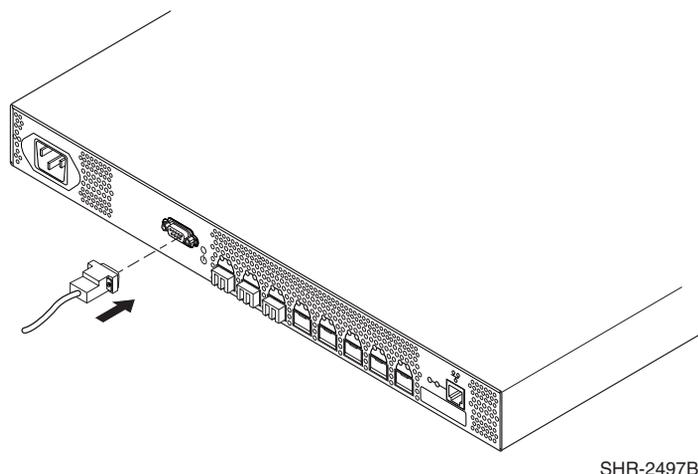
Figure 15: Connecting the Serial cable

3. Connect the other end of the Serial cable to an RS-232 Serial port on the workstation. If no RS-232 Serial port is available on the workstation, the adapter on the end of the Serial cable can be removed to use the RJ-45 connector to create a Serial connection.

4. Verify that the switch power is on and POST is completed. See the "Power On Self-Test" section, on page page 46 in this chapter.

5. Power on the workstation and establish a connection to the switch using a terminal emulator application (such as Hyperterminal).

Note: Step 6 shows instructions specific to HyperTerminal. If using a different application, consult the specific application's documentation.

6. Using Hyperterminal configure the port settings as follows:
   ■ Bits per second: 9600
   ■ Databits: 8
   ■ Parity: None
   ■ Stop bits: 1
   ■ Flow control: None

To configure port settings in a UNIX® environment, type:

```
tip /dev/ttyb -9600
```

7. Log onto the switch (with administrative privileges). The default administrative logon is admin and the default password is password.

   a. Enter the following at the prompt:

      ipAddrSet

   b. Enter the following information at the corresponding prompts, listed below:

      — Ethernet IP Address [10.77.77.77]:
        Enter the new Ethernet IP address.

      — Ethernet subnetmask [0.0.0.0]:
        Enter the new Ethernet subnetmask.

      — Fibre Channel IP Address [none]:
        Enter the new Fibre Channel IP address if desired.

      — Fibre Channel subnetmask [none]:
        Enter the new Fibre Channel subnetmask if desired.

      — Gateway Address [172.17.1.1]:
        Enter the new gateway address.

      — Set IP address now? [y = set now, n = next reboot]:
        Enter y to set now.

   c. To verify that the IP address was entered correctly, type:

      ipAddrShow

   d. Once the IP address is verified as correct, remove the Serial cable, and replace the shipping plug in the Serial port.

   > **Caution:** The Serial port is intended only for use during the initial setting of the IP address and for service purposes. Using the Serial port during normal switch operation or for regular maintenance is not recommended.

8. Record the IP address on the label affixed to the SAN Switch 2/8 front panel.

Connecting the SAN Switch 2/8 to the LAN

Use the following steps to connect the SAN Switch 2/8 to the Ethernet Local Area Network (LAN) segment.

1. Remove the shipping plug from the SAN Switch 2/8 Ethernet port.

2. Connect one end of an Ethernet cable to the Ethernet port, see Figure 16.

SHR-2498B
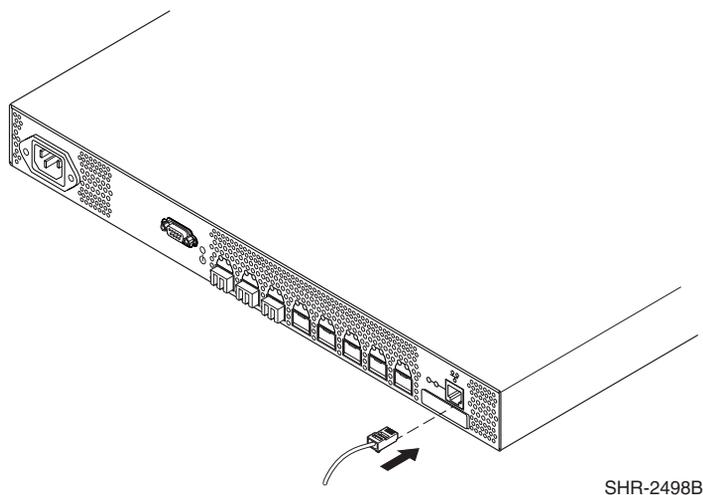
Figure 16: Connecting the Ethernet cable

3. Connect the other end of the Ethernet cable to the workstation or to an Ethernet network containing the workstation.

Note: You can now access the switch remotely (and from multiple connections), using telnet or the Web Tools application. Verify that the switch is not accessed from any other connections during the remaining steps.

---

4. Log on to the switch with administrative privileges by telnet. The default administrative logon is admin and the default password is password.

Important Information on Setting the CORE PID Format

After connecting the SAN Switch 2/8 via Ethernet, you must verify that all switches you intend to connect to the SAN use the same Core Port Identifier (PID) format. A PID is one of two addressing mechanisms used in Fibre Channel. The PID is analogous to specifying the physical switch and port a device is attached to in data networks. It is not analogous to an IP address. PIDs are assigned by a Fibre Channel switch when a device logs into the fabric.

An example PID might look like this:

011F00

In new installations, where both edge and Core switches reside, you must verify that the edge switch (for example, SAN Switch 2/8) PID format matches the Core switch's PID format, before connecting to the SAN.

For example, switches with firmware V3.0.2f or later have the PID set to 1. For a SAN to work correctly, all HP StorageWorks SAN switches or HP Surestore FC switches must have the same PID format setting, either 0 or 1. If a switch is introduced to an existing SAN with a setting that differs from the setting on the SAN, the switch will segment.

How to Check the Current Core PID Setting

To determine a switch's current Core PID format, connect directly to a switch in your SAN and complete the following steps via a telnet session, or the serial cable supplied with the switch.

Note: All switches in the SAN require the same PID format setting.

---

1. Type **configShow** and press **Enter**.
2. About 15 lines down (press **Enter** to display more information on the page), locate the following line:

        fabric.ops.mode.pidFormat:

3. Type **switchDisable** and press **Enter**.
4. Type **configure** and press **Enter**.
5. Type y at the Fabric parameters prompt, (yes, y, no, n): [no] y.

6. To view the Core Switch PID setting, press **Enter** until you reach the Core Switch PID format line, similar to the following.

   ```
   Core Switch PID Format: (0..1) [0]
   ```

Note: The [0] value shown above indicates the Core Switch PID parameter set on this particular switch.

---

7. Continue to press **Enter** until the admin prompt displays.

8. Type **switchEnable** and press **Enter**.

If necessary, proceed to the next section to change the Core PID setting to match all switches that will reside in the SAN.

How to Change the Core PID Format

Note: HP switches ship with the Core switch PID set to 1. HP recommends that if you are in the process of creating a new SAN, set the PID to 1 for all switches in the SAN.

In order for the switches to interoperate properly, all of them must have the same Core PID format. Use these steps to change the Core PID format, if necessary.

⚠ **Caution:** If you need to change the PID format on this new switch, change the PID format before connecting the fiber cables.

---

1. If the switch is configured for zoning, type cfgDisable to disable zoning.
2. To disable the switch, type SwitchDisable.
3. To reset the PID format, use the "configure" telnet command. Type configure. The following displays:

   Configure...
4. Type y at the Fabric parameters prompt,

   Fabric parameters (yes, y, no, n): [no] y
5. Locate the line, "Core Switch PID Format: (0..1) [0] 1," and type 1.
6. Press **Enter** until the following prompt appears.

Committing configuration...Done

7. At the prompt type, SwitchEnable.

8. After setting the Core PID to match the the other switches in the fabric, go to the "Connecting the SAN Switch 2/8 to the LAN" section on page 50 in this chapter, for instructions on connecting Fibre Channel cables.

9. If necessary, type **cfgEnable** to re-establish zoning.

Note: Once the switch PID format is set, it is stored in the flash memory of the switch and it is NOT necessary to set it again during subsequent firmware upgrades.

Modifying Domain IDs

Optional. Modify the domain IDs if desired, as follows.

Note: It is best to assign a unique domain ID prior to connecting the switch to other switches in the SAN. This eliminates the possibility of domain ID overlap.The default domain ID is 1. If the default domain ID is already in use when the switch is connected to the fabric, the domain ID for the new switch is automatically reset to a unique value. The domain IDs that are currently in use can be determined using the telnet command, fabricShow.

---

1. To disable the switch, type:

    switchDisable

2. Enter the following:

    configure

3. Enter y after the Fabric Parameters prompt.

    ```
    Fabric parameters (y, n)
    ```

4. Enter a unique domain ID (such as the domain ID used by the previous switch, if still available).

    ```
    Domain: (1..239) [1] 3
    ```

5. Complete the remaining prompts (or press **CTRL+D** to accept the remaining settings without completing all the prompts).

6. Re-enable the switch, type:

    ```
    switchEnable
    ```

Specifying Custom Status Policies

Optional. If desired, specify any custom status policies for the fabric as follows.

1. Enter the following at the prompt.

    ```
    switchStatusPolicySet
    ```

2. Specify the desired status policies. To completely deactivate the alarm for a particular condition, enter 0 at the prompt for that condition.

Connecting a Cable to an SFP Module

Use these steps to connect the SFPs and cables to SAN Switch 2/8 ports as required.

Note: The ports and cables used in trunking groups must meet specific requirements. For a list of these requirements, refer to the *hp StorageWorks ISL Trunking V3.0.x/V4.0.x User Guide*.

1. Remove the shipping plugs from the appropriate ports.
2. Position the SFP so that the key (the tab near the cable-end of the SFP) is on top.
3. Insert the SFP into the port until it is firmly seated and the latching mechanism clicks.

Note: The SFP is keyed so that it can only be inserted with the correct orientation into the port. If the SFP does not slide in easily, check the orientation.

4. Connect the cables to the SFPs as appropriate to the fabric topology, by positioning each cable so that the key (the ridge on one side of the cable connector) is aligned with the slot in the SFP. See Figure 17.

SHR-2499B
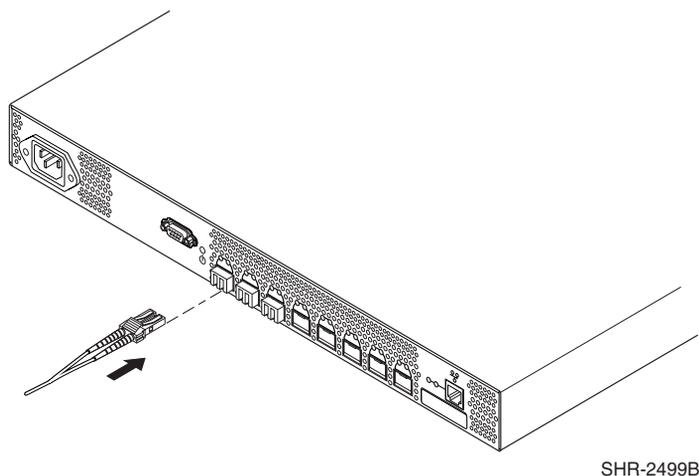
Figure 17: Inserting a cable into an SFP

Note: The cable is keyed so that it can only be inserted correctly into the SFP. If the cable does not slide in easily, check the orientation.

Verifying Operation

After making the appropriate connections, as outlined in this chapter, use these steps to verify that the switch is running properly.

1. Access your browser.

2. At the URL address window type, `http://your switch IP address.`

3. Press **Enter**.

4. If connected properly, the name of your switch appears (in green) in the Web browser window, indicating Healthy/OK.

> **Note:** HP strongly recommends backing up the configuration. This ensures that a complete configuration is available if required for a replacement switch. For instructions on how to back up the configuration, refer to "Backing Up System Configuration Settings" on page 68 in Chapter 4.

Installing Multiple Switches into an Existing SAN

Use these steps to set up more than one SAN Switch 2/8 in an existing SAN.

1. Connect the appropriate components as outlined in the installation section of this chapter.

2. Connect the Serial cable, provided in the carton contents, between a host computer and the Serial port of the switch. See the "Setting Network Addresses via a Serial Connection" on page 47 to make a serial connection through a workstation and to set the IP address.

3. Connect the power cord to the AC connector on the switch. The switch performs POST.

   If a malfunction occurs during POST, error messages are written to the switch error log and can be viewed by a telnet or terminal session when the POST session completes.

   If the malfunction prohibits the switch from completing the boot process (fatal error), the switch stops the boot process. If the switch does not fully boot, the switch prompt will not be displayed when the Serial port is connected.

4. Set the switch domain address using the `configure` command to the next unused domain in the SAN. The default domain setting is 1.

> **Note:** If a switch boot failure occurs, the switch must be taken offline for repair or replacement. Contact your HP Technical Support for assistance.

5. Power off the new switch and connect one Fibre Channel cable from the SAN to the new switch.

Cascading Switches

The domain id number uniquely identifies a switch in a fabric. Normally, the switch automatically assigns the domain ID when a switch is first powered on or when the switch disable/enable command is executed. When two switches are cascaded together, there might be an initial domain ID conflict if the switches had been assigned the same domain ID prior to being cascaded. This can be avoided by changing the domain ID with the configure command.

The domain address may change when disabling and enabling one of the switches, or rebooting one of the switches if the domain is not set using the configure command. Switch parameters for all switches in a SAN must be the same, or the switch may not join the SAN.

Managing the
SAN Switch 2/8

3

This chapter covers the following topics:

Interpreting LED Activity

SAN Switch 2/8 activity and status can be determined through the activity of the LEDs on the switch. The LEDs will flash green, yellow, or orange while the switch is booting and while POST or other diagnostic tests are running. This is normal and does not indicate a problem.

Note: Any errors related to LED activity are listed in the error log. For information about the error log, refer to the *hp StorageWorks Fabric OS V3.0.x/V4.0.x Procedures Guide*.

Front Panel LEDs

The SAN Switch 2/8 front panel includes the following LEDs:

■   One power switch LED on the front panel

■   One port status LED above and to the left of each of the 8 ports

■   One port speed LED above and to the right of each of the 8 ports

Table 4 describes how front panel LEDs communicate switch status.

Table 4: Front Panel LED Patterns During Normal Operation

LED	LED Location	Color Display	Hardware Status	Recommended Action
Switch Power LED	To right of Serial port	No light	Switch is off, or boot is not complete, or boot failed.	Verify switch is on and has completed booting.
		Steady green	Switch is on.	No action required.
		Slow-flashing green	Error log contains one or more port diagnostic error messages.	1. Check port status LEDs, error log, port media, and cables or loopback plugs. 2. Clear error log. 3. Rerun diagnostics to verify error condition is fixed.
Port Status LED	Above each port, on left	No light	No signal or light carrier (media or cable) detected.	Check media and cable.
		Steady green	Port is online (connected to external device) but shows no traffic.	No action required.
		Slow-flashing green	Port is online but segmented, indicating a loopback cable or incompatible switch.	Verify correct device is connected to port.

Table 4: Front Panel LED Patterns During Normal Operation (Continued)

LED	LED Location	Color Display	Hardware Status	Recommended Action
Port Status LED (continued)	Above each port, on left	Fast-flashing green	Port is in internal loopback (diagnostic).	No action required.
		Flickering green	Port is online	No action required.
		Steady orange	Port is receiving signal carrier, but is not yet online.	No action required.
		Slow-flashing orange	Port is disabled (result of diagnostics or portDisable command).	Enable port (via the PortEnable command; refer to the *hp StorageWorks Fabric OS Reference*.
		Fast-flashing orange	Port is faulty.	1. Check port status LEDs, error log, and cable or loopback plug. 2. Clear error log.
		Flashing green	Port is bypassed.	Check configuration of Fibre Channel loop.
Port Speed LED	Above each port, on right	No light	Port is transmitting at 1 Gbps.	No action required.
		Steady green	Port is transmitting at 2 Gbps.	No action required.

Table 4: Front Panel LED Patterns During Normal Operation (Continued)

LED	LED Location	Color Display	Hardware Status	Recommended Action
Ethernet Link Speed LED	Two Left LEDs near Ethernet port	No light	Port is transmitting at 10 Mbps.	No action required.
		Steady green	Port is transmitting and receiving at 100 Mbps.	No action required.
Ethernet Link Activity LED	Two Right LEDs near Ethernet port	No light	No Ethernet traffic is flowing through the RJ-45 port.	Verify switch is powered on, and Ethernet cable is firmly seated.
		Flickering green	Ethernet traffic is flowing through the RJ-45 port.	No action required.

Rear Panel LED

The SAN Switch 2/8 rear panel includes one port readiness LED. Table 5 describes how rear panel LEDs communicate switch status.

Table 5: Rear Panel LED Patterns During Normal Operation

LED	LED Location	Color Display	Hardware Status	Recommended Action
Port Readiness LED	Center of back panel	No light	Switch is off, or boot is not complete, or boot failed.	Verify switch is on and has completed booting.
		Steady green	Switch is on and all ports are ready for use.	No action required.
		Steady yellow	One or more ports are offline.	Verify switch has completed booting and is not disabled. If light is still yellow, check error log and Port Status LEDs.
		Slow-flashing yellow	Error log contains one or more port diagnostic error messages.	1. Check error log, Port Status LEDs, port media, and cables or loopback plugs. 2. Clear error log. 3. Rerun diagnostics to verify error condition is fixed.

Management Overview

The SAN Switch 2/8 can be managed using TCP/IP protocol, in-band over Fibre Channel, or out-of-band by connecting to the Ethernet port. The management functions allow the administrator to monitor fabric topology, port status, physical status, and other information to aid in system debugging and performance analysis.

The SAN Switch 2/8 is compatible with the following management interfaces:

■   CLI via a telnet or serial connection—For more information refer to the *hp StorageWorks Fabric OS V3.0.x/V4.0.x Procedures Guide,* and the *hp StorageWorks Fabric OS V3.0.x/V4.0.x Reference Guide*.

■   Standard SNMP applications—For more information refer to the *hp StorageWorks MIB V3.0.x/V4.0.x Reference Guide*.

■   Web Tools—Provides an easy-to-use GUI, allowing the SAN administrator to monitor and manage entire fabrics and individual switches and ports from a standard workstation. Provides you with the advantage of being "virtually" in front of any fabric, switch, or port. For more information refer to the *hp StorageWorks Web Tools V3.0.x/V4.0.x User Guide*.

Note: The HP StorageWorks SAN Switch 2/8 EL and HP StorageWorks SAN Switch 2/8 Power Pak models offer a different set of integrated features, depending on the model purchased. Please refer to the *hp StorageWorks SAN Switch 2/8 Version 3.0.2k Release Notes* for a complete list of management features enabled on your specific switch.

Displaying the Optional Feature Licenses

Use these steps to display optional features installed on your switch.

1. Log in to the switch as the admin user.

2. At the command line type,

   licenseShow

   This command displays the license keys that have been entered for the switch and the features enabled by those licenses.

Enabling Licensed Features

Licensed features such as QuickLoop and Fabric Watch are already loaded onto the switch firmware, but must be enabled with a license key. Once you have purchased these features you are provided with a key to unlock the feature.

Use these steps to enable a licensed feature.

1. Log in to the switch as the admin user.

2. At the command line enter the following command:

   licenseAdd *aaaBbbCcc*

   (where *aaaBbbCcc* is the license key for a particular feature.)

Note: You must enter a license key for each feature to activate. License keys are case sensitive.

Running Basic Switch Operations Using Telnet

Read the following sections to run common switch operations.

Logging into the SAN Switch 2/8

Use these steps to log into the SAN Switch 2/8.

1. Open a telnet connection to the switch. The login prompt is displayed if the telnet connection successfully found the switch in the network.

Note: The switch must be connected to your IP network through the Ethernet port to enable connection using telnet.

---

2. At the login prompt enter the user ID you are logging in as. For example:

    ```
    login: admin
    ```

    The password prompt is displayed if the user exists.

3. Enter the password for the user:

    ```
    password: xxxxxx
    ```

    The default password is `password`.

4. If the login was successful a prompt is displayed showing the switch name and user ID you are logged in as. For example:

    ```
    switch55>admin:
    ```

Changing the Admin Password and User ID

Use these steps to change the Admin user ID and password.

Note: For security reasons, the first time you log into the Fabric OS you are requested to change the admin user ID and system password.

---

1. Log in to the switch as the admin user.
2. At the command line enter the following command:

    ```
    Password admin
    ```

An interactive session is opened and you are prompted for configuration values.

3. At the `New Username` prompt, enter a new name for the admin user. You can change the name of the admin user without changing the password. Press **Enter** to leave the name as is.

4. At the `Old Password` prompt, enter the old password.

5. At the `New Password` prompt, enter the new password. The new password must be from 8 to 40 characters in length.

6. At the `New Password` prompt, enter the new password exactly as entered to the previous prompt.

7. Press **Enter** to commit the configuration to the firmware.

Configuring the IP and Fibre Channel Address

The SAN Switch 2/8 is shipped with a default IP address of `10.77.77.77`. Use these steps to change the default IP Address and configure the Fibre Channel IP address of the switch.

1. Log in to the switch as the admin user.

2. At the command line enter the following command:

   `ipAddrSet`

   An interactive session is opened and you are prompted for configuration values. Press **Enter** to skip over a prompt and leave the parameter value as is.

3. At the Ethernet IP Address prompt, enter the new IP address for the Ethernet port on the switch. Press **Enter** to continue.

4. At the subnetmask prompt, enter the address of the subnetmask, if applicable. Press **Enter** to continue.

5. At the Fibre Channel IP address prompt, enter the Fibre Channel IP address for the switch. Press **Enter** to continue.

6. At the Fibre Channel subnetmask prompt, enter the address of the subnetmask, if applicable. Press **Enter** to continue.

7. At the gateway address prompt, enter the IP address of the gateway system if applicable. Press **Enter** to continue.

   The configuration is committed to the switch firmware.

8. Enter y at the prompt to have the IP address changes take effect immediately.

Displaying Devices within the Fabric

To verify that you have fabric-wide connectivity when you install a new switch, display the fabric-wide Fibre Channel address list from the newly installed switch. Use these steps to display the fabric.

1. Log in to the switch as the admin user.

2. At the command line enter the following command:

    ```
    nsAllShow
    ```

    This command displays a list of Fibre Channel addresses for all devices in the fabric.

Checking the Firmware Version

Use these steps to display the SAN Switch 2/8 firmware version.

1. Log in to the switch as the admin user.

2. At the command line enter the following command:

    ```
    version
    ```

This command displays the Kernel version, and Fabric OS release number.

Setting the Switch Date and Time

All switches maintain current date and time in non-volatile memory. Date and time are used for logging events. Switch operation does not depend on the date and time; a switch with an incorrect date and time value still functions properly.

Use these steps to set the date and time of a switch.

1. Log in to the switch as the admin user.

2. At the command line enter the following command:

    ```
    date MMDDhhmmYY
    ```

    where:

    — *MM* is the month, valid values are 01-12

    — *DD* is the date, valid values are 01-31

    — *hh* is the hour, valid values are 00-23

    — *mm* is minutes, valid values are 00-59

    — *YY* is the year, valid values are 00-99

> **Note:** Year values greater than 69 are interpreted as 1970-1999, year values less than 70 are interpreted as 2000-2069. The date function does not support daylight saving time or time zones.

Displaying Switch Configuration Settings

Use these steps to display the system configuration settings.

1. Log in to the switch as the admin user.

2. At the command line enter the following command:

   configShow

   The system configuration settings are displayed.

SAN Switch 2/8 Diagnostic Tests

Read the following sections for information on using POST and diagnostic tests.

Interpreting POST Results

Each time the switch is powered on or reset, the switch automatically performs POST, a one minute system check during which the port status LEDs flash different colors.

To determine whether POST completed without errors, verify that all LEDs return to a normal state after POST is complete. If one or more LEDs do not return to a normal state, and this is not due to the switch being set to beacon, refer to the *hp StorageWorks Fabric OS V3.0.x/V4.0.x Procedures User Guide*.

> **Note:** If the switch prompt does not display when POST completes, POST was not successfully completed and the switch should be returned to your switch supplier for repair.

Any errors detected during POST are written to the system log, accessible through the errShow command. For more information about error messages, refer to the *hp StorageWorks Fabric OS V3.0.x/V4.0.x Procedures User Guide*.

Diagnostic Tests

Diagnostic tests help troubleshoot the hardware and the firmware. The diagnostic tests provided on the switch include tests of internal connections and circuitry, fixed media, and any SFP modules and fiber optic cables in use. The tests are implemented by command, either through a telnet session or through a terminal set up for a serial connection to the switch. Some tests require the ports to be connected by external cables, to allow diagnostics to verify the serializer/deserializer interface, as well as the attached SFP and cable.

All diagnostic tests are run at link speeds of both 1 Gbps and 2 Gbps. For information about the specific diagnostic tests and how to run them, refer to the *hp StorageWorks Fabric OS V3.0.x/V4.0.x Procedures User Guide*.

Note: The transmit and receive speed of the links may be temporarily locked to a specific speed during diagnostic testing.

Saving Configuration Settings and Upgrading Firmware

4

This chapter provides the following information:

■ Backing Up System Configuration Settings, page 74

■ Upgrading or Restoring the Switch Firmware, page 76

■ Downloading Firmware from the HP Website, page 76

Backing Up System Configuration Settings

HP strongly recommends saving the configuration after the initial configuration changes and periodically thereafter.

FTP must be used on Windows workstations to back up the system configuration. The FTP server must be running before an upload can occur. Use the RSHD service or FTP on a UNIX machine.

Note: The two supplied utilities, *RSHD.EXE* and *CAT.EXE* currently do not support uploads for Windows, only downloads. These utilities are available from the support website: http://www.hp.com/support.

Use these steps to upload a backup copy of the configuration settings to a host computer.

1. Verify that the RSHD service (on a UNIX machine) or the FTP service (on a Windows or UNIX machine) is running on the host workstation.

2. Log in to the switch as the admin user.

3. At the command line enter the following command:

   ```
   configUpload hostIPaddr, user path_filename password
   ```

   For example, *hostIPaddr* is the IP address of the host computer, *user* is the User ID used to log into this computer, *path_filename* is the path location and filename of the configuration file, and *password* is the password for the user ID specified.

   If only `configupload` is entered, the system prompts you for each parameter, as follows:

   Example:

   ```
   switch:admin> configupload
   Server Name or IP Address [host]: 123.45.678.901
   User Name [user]: kelev
   File Name [config.txt]: switch1
   Protocol (RSHD or FTP) [rshd]: ftp
   Password:
   upload complete
   ```

Restoring the System Configuration Settings

Use these steps to restore the system configuration settings from a backup.

1. Verify that the RSHD service or the FTP service is running on the host workstation.

2. Log in to the switch as the admin user.

3. Shut down the switch by entering the following command:

   ```
   switchDisable
   ```

4. At the command line enter the following command:

   ```
   configDownload hostIPaddr, user, path_filename,password
   ```

   For example, *hostIPaddr* is the IP address of the host computer, *user* is the User ID used to log into this computer, *path_filename* is the path location and filename of the system configuration file, and *password* is the password for the user ID specified.

   Note: The password operand is only required if you are using FTP.

5. Reboot the switch by entering the following command:

   ```
   fastBoot
   ```

Upgrading or Restoring the Switch Firmware

The SAN Switch 2/8 ships with preloaded firmware. In most cases there is no need to update the firmware on the new switch. The firmware version can be determined by using:

■   The version Telnet command

■   The Switch Management Application page in Web Management Tools

Use these steps to upgrade or restore the switch firmware.

1. Verify that the RSHD service or the FTP service is running on the host workstation.

2. Login to the switch as the admin user.

3. At the command line, type:

    firmwareDownload *hostIPaddr, user, path_filename, password*

    For example, where *hostIPaddr* is the IP address of the host computer, *user* is the User ID used to log into this computer, *path_filename* is the path location and filename of the new firmware file, and *password* is the password for the user ID specified.

Note: The password operand is only required if you are using FTP.

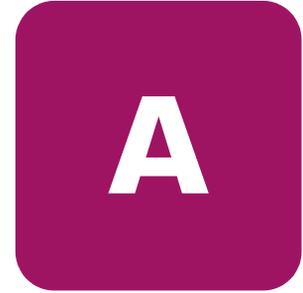
4. Reboot the switch by entering the following command:

    fastBoot

Downloading Firmware from the HP Website

To download the firmware from the HP website, go to http://www.hp.com/support. The website contains the required loaders and instructions for downloading the firmware to a switch.

Regulatory Compliance Notices

A

FCC EMC Statement (USA)

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference, in which case the user will be required to correct the interference at his own expense. The end user of this product should be aware that any changes or modifications made to this equipment without the approval of Hewlett-Packard could result in the product not meeting the Class A limits, in which case the FCC could void the user's authority to operate the equipment.

EMC Statement (Canada)

This Class A digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

Cet appareil numérique de la Classe A respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

EMC Statement (European Union)

This is a Class A product. In a domestic environment this product may cause radio interference, in which case the user may be required to take adequate measures.

Spécification ATI Classe A (France)

DECLARATION D'INSTALLATION ET DE MISE EN EXPLOITATION d'un matériel de traitement de l'information (ATI), classé A en fonction des niveaux de perturbations radioélectriques émis, définis dans la norme européenne EN 55022 concernant la Compatibilité Electromagnétique.

Germany Noise Declaration

Schalldruckpegel Lp = 46.1 dB(A)Am Arbeitsplatz (operator position) Normaler Betrieb (normal operation)Nach ISO 7779:1999 (Typprüfung)

VCCI EMC Statement (Japan)

この装置は、情報処理装置等電波障害自主規制協議会（ＶＣＣＩ）の基準に基づくクラスＡ情報技術装置です。この装置を家庭環境で使用すると電波妨害を引き起こすことがあります。この場合には使用者が適切な対策を講ずるよう要求されることがあります。

Harmonics Conformance (Japan)

高調波ガイドライン適合品

BSMI EMC Statement (Taiwan)

警告使用者：這是甲類的資訊產品，在居住的
環境中使用時，可能會造成射頻干擾，在這種
情況下，使用者會被要求採取某些適當的對策。

RRL EMC Statement (Korea)

사용자 안내문 : A 급기기

이기기는 업무용으로 전자파 적합등록을 받은 기기
이오니, 판매자 또는 사용자는 이점을 주의하시기
바라며, 만약 잘못 구입하셨을 때에는 구입한 곳에
서 비업무용으로 교환하시기 바랍니다.

Laser Safety

A. Certification and Classification Information

When equipped with native Fibre Channel adapters, this product contains a laser internal to the small form factor pluggable (SFP) transceiver modules.

In the USA, the SFP module is certified as a Class 1 Laser product, conforming to the requirements contained in Department Of Health and Human Services (DHHS) regulation 21 CFR, Subchapter J. The certification is indicated by a label on the metal SFP housing.

Outside the USA, the SFP is certified as a Class 1 Laser product conforming to requirements contained in IEC 825-1:1993 and EN60825-1:1994, including Amendment 11:1996.

The SFP includes the following certifications:

■ UL Recognized Component (USA)

■ CSA Certified Component (Canada)

■ TUV Certified Component (European Union)

■ CB Certificate (Worldwide)

The following figure shows the Class 1 information label that appears on the metal housing of the SFP.

CLASS 1 LASER PRODUCT 21 CFR(J)

B. Product Information

Each communications port consists of a transmitter and receiver optical subassembly. The transmitter subassembly contains internally a semiconductor laser diode in the wavelength of either 850 nanometers (shortwave laser) or 1310 nanometers (longwave laser).

Class 1 Laser products are not considered hazardous.

C. Usage Restrictions

Failure to comply with these usage restrictions may result in incorrect operation of the system and points of access may emit laser radiation above the Class 1 limits established by the IEC and U.S. DHHS.

Battery Replacement Notice

Your switch is equipped with a lithium manganese dioxide, a vanadium pentoxide, or an alkaline internal battery or battery pack. There is a danger of explosion and risk of personal injury if the battery is incorrectly replaced or mistreated. Replacement is to be done by an HP authorized service provider using the HP spare designated for this product. For more information about battery replacement or proper disposal, contact your HP authorized reseller or your authorized service provider.

⚠ **WARNING:** Your switch contains an internal lithium manganese dioxide, a vanadium pentoxide, or an alkaline battery. There is risk of fire and burns if the battery is not handled properly. To reduce the risk of personal injury:

— Do not attempt to recharge the battery.

— Do not expose to temperatures higher than 140°F (60°C).

— Do not disassemble, crush, puncture, short external contacts, or dispose of in fire or water.

Batteries, battery packs, and accumulators should not be disposed of with the general household waste. In order to forward them to recycling or proper disposal, please use the public collection system or return them to HP, your authorized HP partners, or their agents.

Electrostatic Discharge

B

To prevent damaging the system, be aware of the precautions you need to follow when setting up the system or handling parts. A discharge of static electricity from a finger or other conductor may damage system boards or other static-sensitive devices. This type of damage may reduce the life expectancy of the device.

To prevent electrostatic damage, observe the following precautions:

- Avoid hand contact by transporting and storing products in static-safe containers.
- Keep electrostatic-sensitive parts in their containers until they arrive at static-free workstations.
- Place parts on a grounded surface before removing them from their containers.
- Avoid touching pins, leads, or circuitry.
- Always make sure you are properly grounded when touching a static-sensitive component or assembly.

Grounding Methods

There are several methods for grounding. Use one or more of the following methods when handling or installing electrostatic-sensitive parts:

- Use a wrist strap connected by a ground cord to a grounded workstation or computer chassis. Wrist straps are flexible straps with a minimum of 1 megohm ± 10 percent resistance in the ground cords. To provide proper ground, wear the strap snug against the skin.

- Use heel straps, toe straps, or boot straps at standing workstations. Wear the straps on both feet when standing on conductive floors or dissipating floor mats.

- Use conductive field service tools.

- Use a portable field service kit with a folding static-dissipating work mat.

If you do not have any of the suggested equipment for proper grounding, have an HP authorized reseller install the part.

Technical Specifications

C

This appendix covers the following topics:

■ Dimensions

■ Power supply specifications

■ Environmental specifications

■ Memory specifications

■ Serial port specifications

Dimensions

Table 6 lists SAN Switch 2/8 dimensions.

Table 6: Physical Specifications

Dimension	Value
Height	1.71 inches (4.34 cm)
Depth	10.4 inches (26.4 cm)
Width	16.9 inches (42.8 cm)
Weight (with both power supplies)	8.5 lbs (3.9 kg)

Power Supply Specifications

Table 7 lists power supply specifications. The power supply is universal and capable of functioning worldwide without using voltage jumpers or switches. It meets IEC 61000-4-5 surge voltage requirements The power supply has its own built-in fan for cooling, pushing the air towards the front of the switch.

Table 7: Power Supply Specifications

Specification	Value
Outlet	Correctly wired and earth-grounded
Total power available from each power supply	75 watts
Max. switch power	50 watts
Input voltage	90 - 264 VAC
Input line frequency	47 - 63 Hz
Harmonic distortion	Active power factor correction per IEC1000-3-2
BTU rating	70 Watts x 3.412 BTU/Hr/Watts = 239 BTU/hr
Inrush current	40 Amps Peak, cold start at 25 degrees Celsius
Input line protection	Fused in both hot & neutral lines

Environmental Requirements

Table 7 lists the environmental ranges that are acceptable when the SAN Switch EL is operating, and the acceptable ranges when the switch is not operating.

Table 8: Environmental Requirements

Condition	Acceptable Range
Temperature (operating)	10°C to 40°C
Temperature (non-operating)	-25°C to 70°C
Humidity (operating)	20% to 85% RH non condensing, at 40°C
Humidity (non-operating)	0% to 90% RH non-conducting, at 40°C
Altitude (operating)	0 to 3 kilometers above sea level
Altitude (non-operating)	0 to 12 kilometers above sea level
Shock (operating)	4G, 11MS duration, half sine
Shock (non-operating)	20G, 11MS duration, sq.wave
Vibration (operating)	5G, 0-3 kHz at 1.0 octave/minute
Vibration (non-operating)	10G, 0-5kHz at 1.0 octave/minute

Memory Specifications

The SAN Switch 2/8 uses the following memory.

- Main Memory (SDRAM): 32 MB per switch
- Flash Memory: Dual 8 MB
- Boot Flash: 512K bytes of 8-bit for system boot

The centralized memory maximizes the overall switch throughput by guaranteeing full transmit and receive bandwidth to all Fibre Channel ports at all times.

Serial Port Specifications

The Serial port can be used to connect to a computer workstation to configure the switch IP address without connecting to the fabric. The Serial port's parameters are 9600 baud, 8 data bits, no parity, 1 stop bit, and no flow control.

The port requires a straight serial cable with a female 9-pin subminiature-D connector. Only pins 2, 3, and 5 are supported; if pin 7 is used, the signal must always be driven high, using the pinouts listed in Table 9.

Table 9: Cabling Pinouts if Pin 7 is Used

PIN	Signal	Description
1		
2	TxData	Transmit Data
3	RxData	Receive Data
4		
5	GND	Logic Ground
6		
7	CTS	Clear to Send
8		
9		

Note: For dust and ESD (electrostatic discharge) protection, a cover is provided for the serial port and should be kept on the port whenever the serial port is not in use.

glossary

This glossary defines terms used in this guide or related to this product and is not a comprehensive glossary of computer terms.

AL_PA

Arbitrated Loop Physical Address; a unique 8-bit value assigned during loop initialization to a port in an arbitrated loop.

Alias Address Identifier

An address identifier recognized by a port in addition to its standard identifier. An alias address identifier may be shared by multiple ports.

Alias AL_PA

An AL_PA value recognized by an L_Port in addition to the AL_PA assigned to the port.

Alias Server

A fabric software facility that supports multicast group management.

API

Application Programming Interface; defined protocol that allows applications to interface with a set of services.

Arbitrated Loop

A shared 100 MBps or 200 MBps Fibre Channel transport structured as a loop. Can support up to 126 devices and one fabric attachment. See also *Topology*.

ASIC

Application Specific Integrated Circuit.

ATM

Asynchronous Transfer Mode; a transport used for transmitting data over LANs or WANs that transmit fixed-length units of data. Provides any-to-any connectivity, and allows nodes to transmit simultaneously.

AW_TOV

Arbitration Wait Time-out Value; the minimum time an arbitrating L_Port waits for a response before beginning loop initialization.

Bandwidth

The total transmission capacity of a cable, link, or system. Usually measured in bps (bits per second). May also refer to the range of transmission frequencies available to a network. See also *Throughput*.

BB_Credit

Buffer-to-buffer credit; the number of frames that can be transmitted to a directly connected recipient or within an arbitrated loop. Determined by the number of receive buffers available.

BER

Bit Error Rate; the rate at which bits are expected to be received in error. Expressed as the ratio of error bits to total bits transmitted. See also *Error*.

Block

As applies to Fibre Channel, upper-level application data that is transferred in a single sequence.

Bridge

Hardware that connects incompatible networks by providing translation for both hardware and software. For example, an ATM gateway can connect a Fibre Channel link to an ATM connection.

Broadcast

The transmission of data from a single source to all devices in the fabric, regardless of zoning.

Buffer-to-buffer Flow Control

Management of the frame transmission rate in either a point-to-point topology or in an arbitrated loop. See also *BB_Credit*.

Cascade

Two or more interconnected Fibre Channel switches. The recommended number of interswitch links is seven. See also *Fabric*, *ISL*.

Chassis

The metal frame in which the switch and switch components are mounted.

Circuit

An established communication path between two ports. Consists of two virtual circuits capable of transmitting in opposite directions. See also *Link*.

Command Line
Interface that depends entirely on the use of commands, such as through telnet or SNMP, and does not involve a GUI.

Community (SNMP)
A relationship between a group of SNMP managers and an SNMP agent, in which authentication, access control, and proxy characteristics are defined. See also *SNMP*.

Connection Initiator
A port that has originated a Class 1 dedicated connection and received a response from the recipient.

Connection Recipient
A port that has received a Class 1 dedicated connection request and transmitted a response to the originator.

CRC
Cyclic Redundancy Check; a check for transmission errors included in every data frame.

Credit
As applies to Fibre Channel, the number of receive buffers available for transmission of frames between ports. See also *BB_Credit*, *EE_Credit*.

Disparity
The relationship of ones and zeros in an encoded character. "Neutral disparity" means an equal number of each, "positive disparity" means a majority of ones, and "negative disparity" means a majority of zeros.

DLS
Dynamic Load Sharing; dynamic distribution of traffic over available paths. Allows for recomputing of routes when an Fx_Port or E_Port changes status.

Domain ID
As applies to SAN switches, a unique number between 1 and 239 that identifies the switch to the fabric and is used in routing frames. Usually automatically assigned by the switch, but can be manually assigned.

E_D_TOV
Error Detect Time-out Value; the minimum amount of time a target waits for a sequence to complete before initiating recovery. Can also be defined as the maximum time allowed for a round-trip transmission before an error condition is declared.

E_Port
Expansion Port; a type of switch port that can be connected to an E_Port on another switch to create an ISL. See also *ISL*.

EE_Credit
End-to-end Credit; the number of receive buffers allocated by a recipient port to an originating port. Used by Class 1 and 2 services to manage the exchange of frames across the fabric between source and destination. See also *End-to-end Flow Control*, *BB_Credit*.

EIA Rack
A storage rack that meets the standards set by the Electronics Industry Association.

Enabled Zone Configuration
The currently enabled configuration of zones. Only one configuration can be enabled at a time.

End-to-end Flow Control
Governs flow of class 1 and 2 frames between N_Ports. See also *EE_Credit*.

Error
As applies to Fibre Channel, a missing or corrupted frame, time-out, loss of synchronization, or loss of signal (link errors).

Exchange
The highest level Fibre Channel mechanism used for communication between N_Ports. Composed of one or more related sequences, and can work in either one or both directions.

F_Port
Fabric Port; a port that is able to transmit under fabric protocol and interface over links. Can be used to connect an N_Port to a switch.

Fabric Name
The unique identifier assigned to a fabric and communicated during login and port discovery.

Fabric
A Fibre Channel network containing two or more switches in addition to hosts and devices. May also be referred to as a switched fabric. See also *Topology*, *SAN*, *Cascade*.

FC-AL-3
The Fibre Channel Arbitrated Loop standard defined by ANSI. Defined on top of the FC-PH standards.

FC-FLA
The Fibre Channel Fabric Loop Attach standard defined by ANSI.

FCIA

Fibre Channel Industry Association. An international organization of Fibre Channel industry professionals. Among other things, provides oversight of ANSI and industry developed standards.

FCP

Fibre Channel Protocol; mapping of protocols onto the Fibre Channel standard protocols. For example, SCSI FCP maps SCSI-3 onto Fibre Channel.

Fibre Channel Transport

A protocol service that supports communication between Fibre Channel service providers.

FL_Port

Fabric Loop Port; a port that is able to transmit under fabric protocol and also has arbitrated loop capabilities. Can be used to connect an NL_Port to a switch.

FLOGI

Fabric Login; the process by which an N_Port determines whether a fabric is present, and if so, exchanges service parameters with it.

Frame

The Fibre Channel structure used to transmit data between ports. Consists of a start-of-frame delimiter, header, any optional headers, the data payload, a cyclic redundancy check (CRC), and an end-of-frame delimiter. There are two types of frames: Link control frames (transmission acknowledgements, etc.) and data frames.

FS_ACC

Fibre Channel Services Accept. The information unit used to indicate acceptance of a request for a Fibre Channel service.

FSP

Fibre Channel Service Protocol; the common protocol for all fabric services, transparent to the fabric type or topology.

FSPF

Fabric Shortest Path First; the routing protocol for Fibre Channel switches.

Full Fabric

The licensing that allows multiple E_Ports on a switch, making it possible to create multiple ISL links.

Full-duplex

A mode of communication that allows the same port to simultaneously transmit and receive frames.

Fx_Port
A fabric port that can operate as either an F_Port or FL_Port.

G_Port
Generic Port; a port that can operate as either an E_Port or F_Port. A port is defined as a G_Port when it is not yet connected or has not yet assumed a specific function in the fabric.

Gateway
A device such as a switch that connects different subnets together. A switch can be used as a gateway from the Ethernet to the Fibre Channel. Set the gateway address on one switch to the Fibre Channel IP address of another switch to enable the other switch to forward IP traffic to the ethernet port on the second switch.

Gbps
Gigabits per second (1,062,500,000 bits/second).

GBps
GigaBytes per second (1,062,500,000 bytes/second).

HBA
Host Bus Adapter; the interface card between a server or workstation bus and the Fibre Channel network.

Hub
A Fibre Channel wiring concentrator that collapses a loop topology into a physical star topology. Nodes are automatically added to the loop when active and removed when inactive.

Idle
Continuous transmission of an ordered set over a Fibre Channel link when no data is being transmitted, to keep the link active and maintain bit, byte, and word synchronization.

ISL
Interswitch Link; a Fibre Channel link from the E_Port of one switch to the E_Port of another. See also *E_Port*, *Cascade*.

Isolated E_Port
An E_Port that is online but not operational due to overlapping domain IDs or nonidentical parameters (such as E_D_TOVs).

IU
Information Unit; a set of information as defined by either upper-level process protocol definition or upper-level protocol mapping.

L_Port
Loop Port; a node port (NL_Port) or fabric port (FL_Port) that has arbitrated loop capabilities. An L_Port can be in one of two modes:

- *Fabric mode* Connected to a port that is not loop capable, and using fabric protocol.

- *Loop mode* In an arbitrated loop and using loop protocol. An L_Port in loop mode can also be in participating mode or non-participating mode.

Latency
The period of time required to transmit a frame, from the time it is sent until it arrives.

Link Services
A protocol for link-related actions.

Link
As applies to Fibre Channel, a physical connection between two ports, consisting of both transmit and receive fibers.

LIP
Loop Initialization Primitive; the signal used to begin initialization in a loop. Indicates either loop failure or resetting of a node.

Looplet
A set of devices connected in a loop to a port that is a member of another loop.

MIB
Management Information Base; an SNMP structure to help with device management, providing configuration and device information.

Monitoring State
The state in which a port is monitoring the flow of information for data relevant to the port.

Multicast
The transmission of data from a single source to multiple specified N_Ports (as opposed to all the ports on the network).

Multimode
A fiber optic cabling specification that allows up to 500 meters between devices.

N_Port
Node Port; a port on a node that can connect to a Fibre Channel port or to another N_Port in a point-to-point connection.

NAA
Network Address Authority. An identifier that indicates the format of a network address.

Name Server
Frequently used to indicate Simple Name Server.

NL_Port
Node Loop Port; a node port that has arbitrated loop capabilities. Used to connect an equipment port to the fabric in a loop configuration through an FL_Port.

Node Name
The unique identifier for a node, communicated during login and port discovery.

Node
A Fibre Channel device that contains an N_Port or NL_Port.

Open Originator
The L_Port that wins arbitration in an arbitrated loop and sends an OPN ordered set to the destination port, then enters the Open state.

Open Recipient
The L_Port that receives the OPN ordered set from the open originator, and then enters the Open state.

Phantom Address
An AL_PA value that is assigned to an device that is not physically in the loop. Also known as phantom AL_PA.

A twenty-bit public address created for an 8-bit loop device to allow public devices to access it.

Phantom Device
A device that is not physically in an arbitrated loop, but is logically included through the use of a phantom address.

PLOGI
Port Login; the port-to-port login process by which initiators establish sessions with targets.

Point-to-point
A Fibre Channel topology that employs direct links between each pair of communicating entities. See also *Topology*.

Port Cage
The metal casing extending out of the optical port on the switch, and in which the SFP can be inserted.

Port_Name
The unique identifier assigned to a Fibre Channel port. Communicated during login and port discovery.

POST
Power On Self-Test; a series of tests run by a switch after it is turned on.

Private Device
A device that supports arbitrated loop protocol and can interpret 8-bit addresses, but cannot log into the fabric.

Private Loop
An arbitrated loop that does not include a participating FL_Port.

Private NL_Port
An NL_Port that communicates only with other private NL_Ports in the same loop and does not log into the fabric.

Protocol
A defined method and a set of standards for communication.

Public   NL_Port
An NL_Port that logs into the fabric, can function within either a public or a private loop, and can communicate with either private or public NL_Ports.

Public Device
A device that can log into the fabric and support 20-bit addresses (or has 20-bit phantom addresses created for it by the switch).

Public Loop
An arbitrated loop that includes a participating FL_Port, and may contain both public and private NL_Ports.

QuickLoop
A feature that makes it possible to allow private devices within loops to communicate with public and private devices across the fabric through the creation of a larger loop.

May also refer to the arbitrated loop created using this software. A QuickLoop can contain a number of devices or looplets; all devices in the same QuickLoop share a single AL_PA space.

R_A_TOV
Resource Allocation Time-out Value; the maximum time a frame can be delayed in the fabric and still be delivered.

Route
As applies to a fabric, the communication path between two switches. May also apply to the specific path taken by an individual frame, from source to destination.

Routing
The assignment of frames to specific switch ports, according to frame destination.

RR_TOV
Resource Recovery Time-out Value; the minimum time a target device in a loop waits after a LIP before logging out a SCSI initiator.

RSCN
Registered State Change Notification; a switch function that allows notification of fabric changes to be sent from the switch to specified nodes.

RX_ID
Responder Exchange Identifier. A 2-byte field in the frame header used by the responder of the Exchange to identify frames as being part of a particular exchange.

SAN
Storage Area Network; a network of systems and storage devices that communicate using Fibre Channel protocols. See also *Fabric*.

Sequence
A group of related frames transmitted in the same direction between two N_Ports.

Service Rate
The rate at which an entity can service requests.

Single Mode
The fiber optic cabling standard that corresponds to distances of up to 10 km between devices.

SNMP
Simple Network Management Protocol. An internet management protocol that uses either IP for network-level functions and UDP for transport-level functions, or TCP/IP for both. Can be made available over other protocols, such as UDP/IP, because it does not rely on the underlying communication protocols.

Switch Name
The arbitrary name assigned to a switch.

Switch Port
A port on a switch. Switch ports can be E_Ports, F_Ports, or FL_Ports.

Switch
Hardware that routes frames according to Fibre Channel protocol and is controlled by software.

Target
A storage device on a Fibre Channel network.

Tenancy
The time from when a port wins arbitration in a loop until the same port returns to the monitoring state. Also referred to as loop tenancy.

Throughput
The rate of data flow achieved within a cable, link, or system. Usually measured in bps (bits per second).

Topology
As applies to Fibre Channel, the configuration of the Fibre Channel network and the resulting communication paths allowed. There are three possible topologies:

■   Point to point - A direct link between two communication ports.

■   Switched fabric - Multiple N_Ports linked to a switch by F_Ports.

■   Arbitrated loop - Multiple NL_Ports connected in a loop.

Transfer State
The state in which a port can establish circuits with multiple ports without reentering the arbitration cycle for each circuit. This state can only be accessed by an L_Port in the Open state.

Translative Mode
A mode in which private devices can communicate with public devices across the fabric.

Transmission Character
A 10-bit character encoded according to the rules of the 8B/10B algorithm.

Transmission Word
A group of four transmission characters.

Trap (SNMP)
The message sent by an SNMP agent to inform the SNMP management station of a critical error.

Tunneling
A technique for enabling two networks to communicate when the source and destination hosts are both on the same type of network, but are connected by a different type of network.

U_Port

Universal Port; a switch port that can operate as a G_Port, E_Port, F_Port, or FL_Port. A port is defined as a U_Port when it is not connected or has not yet assumed a specific function in the fabric.

UDP

User Datagram Protocol; a protocol that runs on top of IP and provides port multiplexing for upper-level protocols.

ULP_TOV

Upper-level Time-out Value; the minimum time that a SCSI ULP process waits for SCSI status before initiating ULP recovery.

ULP

Upper-level Protocol; the protocol that runs on top of Fibre Channel. Typical upper-level protocols are SCSI, IP, HIPPI, and IPI.

Well-known Address

As pertaining to Fibre Channel, a logical address defined by the Fibre Channel standards as assigned to a specific function, and stored on the switch.

Workstation

A computer used to access and manage the fabric. May also be referred to as a management station or host.

WWN

Worldwide Name; an identifier that is unique worldwide. Each entity in a fabric has a separate WWN.

Xmitted Close State

The state in which an L_Port cannot send messages, but can retransmit messages within the loop. A port in the XMITTED CLOSE state cannot attempt to arbitrate.

Zone Configuration

A specified set of zones. Enabling a configuration enables all zones in that configuration.

Zone

A set of devices and hosts attached to the same fabric and configured as being in the same zone. Devices and hosts within the same zone have access permission to others in the zone, but are not visible to any outside the zone.

Zoning

A feature that runs on Fabric OS and allows partitioning of the fabric into logical groupings of devices. Devices in a zone can only access and be accessed by devices in the same zone.

index